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E. RULE

DETERMINATION OF THE ECONOMICAL PERIODS OF AERIAL AND UNDERGROUND TELEPHONE CABLES

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A DETERMINATION OF THE ECONOMICAL PERIODS OF AERIAL AND UNDERGROUND TELEPHONE CABLES

BY

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A THESIS SUBMITTED FOR THE DEGREE OF

BACHELOR OF SCIENCE

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-: INTRODUCTION :-

In telephone work cable plans are necessary to indicate for any given area or neighborhood the locations and size of such cables and terminals together with other necessary equipment and construction as are required to provide facilities throughout this area or neighborhood for a definite length of time, in a most economical and efficient manner.

When drawing up these cable plans many conditions must be taken into consideration. If the plans are to be drawn for an entirely new plant, a fundamental plan or development study should first be made which shows the conduit feeds and the location of the central office. There should likewise be a commercial study available which shows the growth estimated for the period to be covered by the plans. This period generally covers from three to five years. This study should preferably show the stations and class of service of the expected business for the various periods for which facilities are to be provided. In this connection all rate changes or anticipated rate changes should be given careful consideration.

If the plant is already in existence equally as great care should be exercised in making a cable study. The fact that a large amount of existing plant can probably

be economically used should be given due consideration. All existing plant that is in good condition, and for which no reason exists for removing, should be used. The use of existing plant which does not conform to approved construction method, or which may cause a change from the theoretically best plan of distribution is important. A comparison of the present worth of the annual costs will determine if the existing plant can be economically retained. There may, however, be factors of more importance than economy, which will make it advisable to either establish new routes or retain existing routes.

It is evident, therefore, that the proper and economical planning of facilities is dependent upon the kind and number of the existing circuits and upon the estimates of future growth.

When considering facilities into new territory one might rightfully ask himself such important questions as the following.

In the slow growing outer portions of the larger exchanges, commonly known as "Thin Territory" and in all portions of the smaller and farm line exchanges where the estimated growth is such that the number of circuits at the ultimate period (ten or fifteen years hence) will not exceed fifteen, is it more economical to provide open wire or cable?

On the more thickly built up areas of the larger exchanges, where the estimated growth for the ultimate period will not require cable, what kind of wire should be used?

Where the growth estimate indicates that cable should be ultimately erected, but where the estimated rate of growth is slow, up to how many circuits is it economical to postpone the erection of cable by the use of twisted pair distributing wire?

If the expected rate of growth is rapid, will it be more economical to erect cable at once and dismantle the existing open wire plant?

If the rate of growth expected is less than mentioned in previous paragraph, but is greater than that outlined in the definition of "Thin Territory," how long will it generally be economical to postpone the erection of cable?

When is it economical under certain conditions to erect cable and at which point in the growth of the plant should this cable be dismantled and replaced by underground construction?

Therefore, it is evident that in order to determine the size of cable which will serve a given area in a most economical manner it is absolutely necessary that an accurate estimate of the rate of growth be furnished. The

fundamental plan will show the ultimate number of lines for any given area, but these figures are of no use in figuring cable sizes to provide facilities, except in such cases where a cable is designed to care for the ultimate. For this reason a commercial estimate covering a period of about five years is necessary in order to properly engineer a cable plan. The period of five years embraces the economical periods of all aerial and underground cables, for practical purposes.

Therefore, it is this study showing the relation between the size of cable and growth, which determines what is known as the "economical period" of aerial and underground cables and it is this study with which the authors of this thesis are concerned.

A DETERMINATION OF THE ECONOMIC PERIODS OF AERIAL AND UNDERGROUND TELEPHONE CABLES BY THE PRESENT WORTH METHOD OF CALCULATION

In many engineering problems, especially those pertaining to telephone facilities, it is very advantageous to have a comparatively simple method by which means comparisons may be made relative to the most economical type of plant to install. The method of comparing annual charges is perhaps the best known. The annual charges as used in this thesis are used by all large telephone companies, and are the results of practical experience and knowledge. However, in order to compare annual charges occurring over different periods of time it is necessary to reduce these charges to their present worth.

The present worth of an annual charge payable at some time is an amount which, if set aside now at compound interest will equal the annual charge at the same time.

One dollar at compound interest at the rate of six per cent will at the end of X years amount to 1.06^x. Therefore, if $\frac{\$1.00}{106^x}$ is set aside at the present time, it will at the end of X years equal $1.00. In other words, the present worth of $1.00 is the reciprocal of the amount of $1.00 at 6% compound interest for the length of time considered.

The present worth of an annual charge of $1.00 for a period of X years is represented by the sum of the present worths of the charge for each year as shown below.

$$\frac{\$1.00}{1.06} + \frac{\$1.00}{1.05^2} + \frac{\$1.00}{1.06^3} + \cdots\cdots \frac{\$1.00}{1.06^{x1}} + \frac{\$1.00}{1.06^x}$$

If the annual charges for the period between the N th year

and the Xth year, inclusive, will be -

$$\frac{\$1.00}{1.06^{n-1}} + \frac{\$1.00}{1.06^{n-1}} - \cdots\cdots\cdots \frac{\$1.00}{1.06^{x-1}} + \frac{\$1.00}{1.06^{x}}$$

which is equivalent to

$$\left(\frac{\$1.00}{1.06} + \frac{\$1.00}{1.06^{x}}\right) \qquad\qquad \left(\frac{\$1.00}{1.06} + \frac{\$1.00}{1.06^{n}}\right)$$

In order to facilitate the work of computation, a table of these values has been prepared. (See Table I.)

The question which naturally arises in the mind of any investor where choice is to be made between various plans of construction is "Which is the more economical." The probable answer would seem to be in favor of the construction with the smallest first cash. This, however, is not always so, especially if the plans are compared over a definite and rather long period of years, so that the effect and expense of the various charges in the arrangement of the plant which are incident to the various plans may be given due consideration.

Suppose two different plans of construction are under consideration. Assume that either plan aims to reach a capacity equivalent to a fifty pair cable at the end of X years. It is plain that a fifty pair cable could be erected in the first place and could be left up X years. Or a twenty-five pair cable could be erected for $\frac{X}{2}$ years, at the end of which time another twenty-five pair cable could be erected. Possibly other combinations could be arranged. At any rate annual charges would be incurred during the X years on the investment, and these charges would be distributed through the X years in a very different manner in the various plans. In order to determine which plan would be the most economical, the annual

charges are reduced to a common basis of comparison by computing the present worth of the annual charges falling due in the various years. That plan which shows the least present worth for the X years is the one preferred.

The annual charges incurred on the equipment and other losses and charges to be computed are as follows:

I - Interest
T - Taxes
M - Maintenance
D - Depreciation
Insurance
Administration
Transfer Losses
Labor Costs.

Of the above items insurance and administration have been neglected, because they are of such slight consequence that they would not naturally affect the results of the thesis.

Interest:

The common engineering practice is to figure the rate of interest at 6%. This rate of interest will be adopted in the computation of this thesis.

Taxes:

Taxes as a general average are taken as 1.5% of the original value of the plant. In some places, special taxes are levied by municipal legislation. Such taxes are usually levied on the poles, wire, or underground con-

duit. This tax usually consists in the right to occupy certain portions of the telephone company's plant.

Maintenance:

This item involves the expense of keeping the existing plant in good working condition. It also covers the expense of such changes and rearrangements as are necessary from time to time in order that the plant may serve its proper functions. Maintenance is divided into two parts, repairs and changes.

The expense of keeping the plant in good working condition is chargeable to repairs. This account does not include the cost of replacement of plant due to inadequacy, obsolescence, decay, or gradual deterioration. Testing for and clearing trouble, pulling slack, trimming trees, straightening poles, etc., are common examples of repairs.

Repairs also include the replacement of short lived parts, such as dry batteries, fuses, switchboard lamps, etc. Extraordinary repairs should include such expense as is necessary to restore a plant to its normal condition after a severe damage by fire, storm, flood, or any other unusually severe cause. Replacements in such cases are divided into two classes, extraordinary repairs and reconstruction. The part charged to repairs is equal to the replacement value of the plant less the depreciation,

the balance of the expense is charged to reconstruction.

Depreciation:

In order that the capital investment of a company shall always represent the physical value of the plant, a fund must be set aside from year to year to care for the depreciation of the plant. Of the actual physical fund is not maintained, some provision for depreciation must be made in the distribution of profits. This depreciation fund or amount set aside from the plant earnings is of such a value that when it is added to the actual value of the plant, the sum of the two will always equal the capital invested.

Depreciation is made up from the following causes:

1. A gradual deterioration due to old age, and normal wear and tear, all of which cause replacement of the plant.

2. Obsolescence. This is the result of a plant becoming obsolete due to improvements in construction and machinery, requiring that the plant which is not worn out to be replaced with newer and more up-to-date machinery and equipment.

3. Inadequacy. This is usually caused by growth, which results in portions of the plant becoming too small and requiring replacement by a plant of larger

capacity.

4. Municipal or other public improvements. This is usually caused by legislation or public request, which required that existing plant be replaced by new plant to conform to city ordinances, etc.

Depreciation calculated on a sinking fund basis with cumulative interest on the sinking fund is most generally used in engineering practice, especially in public utility work, and it is the kind adopted in this work. The average depreciation per year is found by dividing the original cost of plant, plus the cost of removal, less the salvage or junk value by the total average years of life of the plant.

An amount of money is set aside annually at compound interest to equal the total depreciation at the end of the natural life of the plant.

Transfer Loss:

The transfer loss is incurred when the cable has not been up its whole life. The losses which would be curtailed under this charge would be ends cut off; liability of damage while in storage; idle investment while cable is in storage; waste due to its often being placed in use again when it does not exactly fit; the possibility of extra cost of transporting it from the warehouse to a new location as compared with shipping new cable direct; bends

and scars in cable which if it had not been disturbed in its first location would not have developed trouble, but which sometimes causes trouble when strung up again in another location; extra cost of putting up old cable as compared with new, due to greater care of handling, extra splices, etc. The above losses amount to 15% of the F. O. B. cost.

Labor Costs:

The labor costs may be sub-divided into the cost of erecting and the cost of removing the material.

In this thesis the above annual charges have been computed for the cables shown on page 16. In order to reduce the charges to a common basis of comparison the present worth of the annual charges falling due in various years, up to ten years have been computed. The results of these computations are shown by the curves on Plates I, II, III and IV.

It will be well to take a concrete example and follow thru the computations which have been used in arriving at these results.

Assume 1000' of 100 pr. 22 gauge aerial cable as an illustration. From Table XIV the "material" cost of 1000' of 100 pr. 22 gauge aerial cable in place is $252.60.

$215.20	Price of Paper Cable	(See Table II.)
15.38	Freight and Cartage	" " II.)
3.13	Price of 600 #2 Hangers	" " II.
11.92	Cost of 6000# Messenger Wire	" " IV.
2.59	Freight and Cartage on Messenger	" " IV.
2.56	Material for 2 Straight Splices	" " VI.
1.82	" " 1 Multiple "	" " VI.
$252.60	Total cost of Material Table	" " XI.

Cost of Labor to Erect (See Table XIV.)

$ 25.00	Labor & Board for stringing Cable and Hangers	" " II.
6.06	Supervision for stringing Cable and Hangers	" " II.
18.50	Labor and Board for stringing Messenger Wire	" " IV.
3.16	Supervision for stringing Messenger Wire	" " IV.
8.00	Labor and Board on 2 Straight Splices	" VI.
1.22	Supervision " " " "	" " VI.
6.50	Labor and Board on 1 Multiple Splice	" " VI.
1.00	Supervision " " " "	" " VI.
6.75	Labor, Board and Supervision on 3 Terminals at $2.25 per Terminal	
$ 76.19	Total cost of Labor to Erect	" " XI.

Cost of Removing Cable $36.23 (See Table XIV.)

The annual charges on the above capital investment:

Interest	6%
Taxes	1.5%
Maintenance	3.0%
Depreciation	4.1%
TOTAL	14.6%

$252.60	Cost of Material	(See Table XI.)
10.35	Depreciation (4.1%)	(" " XII-b)

Removal charges consist of the cost to remove cable, 15% extra depreciation on material, extra splicing charges, and the removal of messenger strand.

$ 36.23	Cost of Removing Cable	(See Table III.) also " XI.
37.95	Transfer Charge (15% on material)	
7.95	Cost to splice thru Terminals ($2.65 per terminal)	
10.93	Cost of Dismantling 6000# Messenger Wire.	(Table V.)
2.07	Labor charge on thru Terminals (.69 per terminal)	
$ 95.13	Removal Charges	(See Column 4 on Table XII-b)

TOTAL Investment Equals -

$252.60 + $76.19 = $328.79 (Column 3 on Table XI.)

$328.79 X (.06 + .015 + .03 = $33.20 I.T.M.
(See Table XII-b)

$328.79 X (.06 + .015 + .03 + 041) = $48.00 I.T.M.D.
(See Table XII-b)

Labor to Erect $76.19 " " XI.

Assume a period of eight years. From Table I the present worth of an annual charge of $1.00 is $6.20, and the present worth of $1.00 is $.63. (Table I.)

$48.00 X 6.20 = $298.40, the present worth of the total annual charges on the cable. (Table XII-b) The present worth of the total annual charges on the cable plus the removal charge is computed as follows:

$10.35 Depreciation (Table XII-b)
$33.20 I. T. M. (" XII-b)

From Table I, .101 is equal to the annuity paid at the end of each year required to amount to $1.00 at the end of eight years.

$76.19 X.101 = $7.69 represents the annuity charge on the labor of erecting the cable.

.63 is the present worth of $1.00 due at the end of eight years.

$95.13 X .63 = $59.93. Present worth of $95.13 at the end of eight years.

$6.20 (10.35 + 33.20) + 7.69) + $59.93 = $379.00. (See Table XII-b) Present worth of the total annual charges on the cable plus the removal charges.

In making the computations for the underground cables, the annual charges were not figured the same as in the case of the aerial cables.

Annual charges on underground cable.

Depreciation..............	3%
Maintenance..............	1%
Interest	6%
Taxes	1.5%
TOTAL	11.5%

Likewise the labor to remove underground cable is different due to the fact that some of the items are not considered in connections with underground cables.

Labor to remove underground cables consist of -

Cost of removing cable,

Extra depreciation on material.

Calculations similar to those previously described were made for all cables tabulated on Page 16. The results are shown on Tables XI to XII-f.

From these data the curves on Plates I, II, III, and IV were constructed.

AERIAL CABLE		UNDERGROUND CABLE	
19 Gauge	22 Gauge	19 Gauge	22 Gauge
25 Pair	25 Pair	25 Pair	25 Pair
50 "	50 "	50 "	50 "
75 "	75 "	75 "	75 "
100 "	100 "	100 "	100 "
150 "	150 "	150 "	150 "
200 "	200 "	200 "	200 "
300 "	300 "	300 "	300 "
	400 "	400 "	
	600 "	600 "	

-: CONCLUSION :-

With the results of the previous calculations as shown on Plates I, II, III and IV, we are now able to answer to some degree of satisfaction and accuracy the prime question asked in the introducing discussion and to determine wherein the application of these results is of some practical value to the engineer in the planning of cables.

As a general rule and guide in selecting the proper size of cable to erect, it is economical under normal conditions to use the sizes of cables indicated in table five, which has been constructed from the curves on Plates I, II, III, and IV. It will be noticed that this table is subject to modification in that it is considered good engineering practice to design what we know as distributing cables for the ultimate period, or fifteen years.

Aerial Cable

Minimum Periods for which cable should furnish facilities.

	22 Gauge	19 Gauge
25 Pr.	7 years	7.5 years
50 "	65 "	8.5 "
75 "	9 "	7.5 "
100 "	8 "	8.0 "
150 "	7 "	8.5 "
200	6.5 "	8.0 "
300	8 "	
400	5.5 "	
600		

Underground Cable

22 Gauge	Main Trench	19 Gauge
100 Pr.	4.5 Years	6.5 Years
150 "	6.5 "	8.0 "
200	7.0 "	5.0 "
300	8.0 "	
400	5.0 "	

More than one four hundred pair cable along a new lead should usually be placed underground and conduit should be extended to meet this requirement, because it is much more economical. However, if conduit can be postponed for a period of two or more years by placing cable smaller than four hundred pair, it usually is economical to do so.

The gauge of the wire should be #22 B&S except when the resistance of this size would exceed the limiting resistance of 350 ohms for subscribers' lines and large multi-office districts, or 500 ohms in single office districts. In multi-office districts consisting of a large office and few small branch offices, the 500 ohm limit may advantageously be retained. The resistance of #22 gauge wire in cable is approximately 180 ohms per mile and the resistance in #19 gauge is approximately 90 ohms per mile. Where subscribers' loops exceed the limiting resistance even when placed in holly in #19 gauge special methods of improving transmission are assured rather than the provision of larger gauge wires.

The #19 gauge wire usually should be placed in

that portion of the subscribers' line furtherest from the office, and no more of this size than necessary to reduce the resistance to the proper figure should be used. No. 19 gauge wires can also be placed other than above stated and in fact should be placed in some other location or for some reason equally as important. The shorter block distributing cables, however, should be #22 gauge. Where there are but few lines requiring #19 gauge conductors it is better to use two pairs of #22 gauge wires in multiple rather than erecting a large gauge cable.

It must be borne in mind that the above advice has been given only from the knowledge obtained from the results of this thesis. Certain conditions may arise in cable planning which may necessitate changes in the data which we have collected. Therefore, the curves could not be adhered to as absolutely accurate.

In conclusion, then, the authors' desire to state that under normal conditions or conditions closely approximating those outlined in this thesis, the practical engineer will find the curves on Plate I, II, III, and IV of ready assistance in making a rapid choice relative to the most economical type of plant to install.

The authors of this thesis acknowledge their indebtedness to Mr. W.G. Schneider, a member of the Public Utilities Commission of Wisconsin, for his painstaking efforts and valuable advice in creating this thesis.

TABLE O.

The following table shows the size of messenger wire used for the different pairs of aerial cables. Splicing table is used in figuring cost to erect only.

#22 Gauge Aerial.

25 Pr.)
50 ")
75 ") 6000# Strand Messenger Wire
100 ")

150 ")
200 ") 10000# " " "

300 ")
400 ")
600 ") 16000" " " "

#19 Gauge Aerial

25 Pr.)
50 ") 6000# Strand Messenger Wire

75 ")
100 ") 10000# " " "

150 ")
200 ")
300 ") 16000# " " "

Splicing
1000 ft. lengths

25 Prs.)
50 ")
75 ") 2 Straight Splices - 1 Multiple and 3 Terminals
100 ") (both aerial and underground."

150 ")
200 ")
300 ")1 Straight - 1 multiple and 3 Terminals.
400 ")
600 ")

TABLE I.

In the following table interest is figured at 6% and is compounded annually.

Years	Compound interest on $1.00	Present worth of $1. due at end of Periods	Present worth of annuity of $1. paid at end of each year	Amount of annuity of $1. paid at end of each year	Annuity paid at end of each year required to amount to $1. in different periods.
1	$1.06	.943	$ .943	$1.00	$100.00
2	1.12	.890	1.83	2.06	48.54
3	1.19	.840	2.67	3.18	31.41
4	1.26	.792	3.47	4.37	22.86
5	1.34	.747	4.22	5.64	17.74
6	1.42	.705	4.92	6.98	14.34
7	1.50	.665	5.58	8.39	11.91
8	1.59	.627	6.22	9.90	10.10
9	1.69	.592	6.80	11.49	8.70
10	1.79	.558	7.36	13.18	7.59
11	1.90	.527	7.88	14.97	6.68
12	2.01	.497	8.38	16.87	5.93
13	2.13	.469	8.35	18.88	5.30
14	2.26	.442	9.30	21.01	4.70
15	2.40	.417	9.72	23.28	4.30
16	2.54	.394	10.10	25.67	3.90
17	2.69	.371	10.48	28.21	3.54
18	2.86	.350	10.83	30.91	3.24
19	3.03	.331	11.15	33.76	2.96
20	3.21	.312	11.47	36.79	2.72
21	3.40	.294	11.77	39.99	2.50
22	3.64	.277	12.05	43.39	2.27
23	3.82	.263	12.28	47.00	2.13
24	4.05	.247	12.55	50.82	1.97
25	4.29	.233	12.80	54.86	1.82

TABLE II.

COST OF PAPER CABLE
Stringing on Messenger, ready for splicing.
(Exclusive of cost of Messenger)
Per 1000' Cable

				Freight and Cartage							
Code and Size	Price of Cable	Price of Hangers #	Total	Wgt. of Cable	Wgt. of Reels	Frt. on Cables and Reels	Cartage	Stringing Cables & Hangers	Supervision	Total Local Dist.	Total Cost
#19 B&S											
C- 10	80.84	600 1-2.14	83.58	930	300	3.83	5.00	20.00	4.32	33.15	116.73
C- 15	98.09	600 1-2.74	100.83	1105	300	4.26	5.00	20.00	4.39	33.65	134.48
C- 25	124.09	600 2-3.13	127.22	1352	300	4.88	5.00	20.00	4.48	34.36	161.58
C- 50	196.02	600 2-3.13	199.15	2037	350	6.84	8.00	25.00	5.98	45.82	244.97
C- 75	263.84	600 3-3.28	267.12	2678	400	8.92	8.00	25.00	6.26	47.98	315.10
C-100	373.90	800 3-4.37	378.27	3918	400	11.80	10.00	25.00	7.02	53.82	432.09
C-150	485.14	800 4-4.51	498.65	4810	(2) 600	15.03	10.00	30.00	8.15	63.18	552.83
C-200	610.74	800 4-4.51	615.25	5880	(2) 700	18.20	10.00	30.00	8.73	66.95	682.18
#22 B&S											
10	57.00	600 1-2.74	59.74	647	300	3.12	5.00	20.00	4.22	32.34	92.08
15	67.18	600 1-2.74	69.92	758	300	3.40	5.00	20.00	4.26	32.66	102.58
25	85.10	600 1-2.74	87.84	963	300	3.91	5.00	20.00	4.34	33.25	121.09
50	126.00	600 1-2.74	128.74	1356	300	4.89	5.00	20.00	4.48	34.37	163.11
75	162.54	600 2-3.13	165.67	1750	325	6.00	5.00	20.00	4.65	35.65	201.32
100	215.20	600 2-3.13	218.33	2252	350	7.58	8.00	25.00	6.06	46.44	264.77
150	282.40	600 3-3.28	285.68	2810	375	8.90	8.00	25.00	6.29	48.19	336.87
200	396.68	800 3-4.37	401.05	4108	400	12.27	10.00	25.00	7.09	54.36	455.41
300	532.40	800 4-4.51	536.91	5140	(2) 600	15.85	10.00	30.00	8.38	64.23	601.14
400	686.19	800 4-4.51	672.70	6328	(2) 700	19.32	10.00	30.00	8.90	68.22	740.92

In the above table freight is figured at 25¢ per 100# for cables and reels, including empty reels returned. If this rate does not apply in the particular case being estimated, correct rates are to be substituted.

TABLE III

Cost of Dismantling Serviceable Cable per 1000'.

Including cost of taking down, testing and placing on reels for future use, and carting to store room.

Code Size	Labor and Board Taking down & Reeling up	Testing	Supervision	Total
#22B.&S.				
A- 10 pr.	11.25	4.08	2.91	22.32
A- 15 "	12.75	4.10	3.41	24.09
A- 25 "	15.00	4.15	3.50	26.80
A- 30 "	16.12	4.18	3.67	28.15
A- 50 "	18.75	4.28	4.10	31.41
A- 60 ""	19.82	4.33	4.27	32.75
A- 75 "	21.00	4.40	4.47	34.27
A-100 "	22.50	4.50	4.73	36.23
A-120 "	23.25	4.60	4.87	37.32
A-150 "	24.32	4.75	5.07	38.89
A-200 "	26.25	5.00	5.44	41.69
A-300 "	30.00	5.50	6.15	47.15
A-400 "	33.75	6.00	6.86	52.61
#19 B.&S.				
C- 10 Pr.	15.00	4.10	3.48	26.68
C- 15 "	16.12	4.15	3.66	28.08
C- 25 "	18.75	4.25	4.09	31.34
C- 30 "	19.50	4.30	4.22	32.32
C- 50 "	22.50	4.50	4.73	36.23
C- 60 "	23.25	4.60	4.87	37.32
C- 75 "	24.32	4.75	5.07	38.89
C-100 "	26.25	5.00	5.44	41.69
C-120 "	27.75	5.20	5.72	43.89
C-150 "	30.00	5.50	6.15	47.15
C-200 "	33.75	6.00	6.86	52.61

NOTE:

Testing consists in testing for defective conductors only, and marking the number of such conductors on the reel.

TABLE IV.

Cost of Messenger Wire
Strung in Exchanges
per 1000'

6000# Messenger

Material

1000'	Messenger	10.33
10	Suspension Clamps	.57
10	Thru Bolts	.68
2 -3	Bolt Clamps	.22
1	Thimble	.02
2	Strain Plates	.10
	Total....	11.92

Freight and Cartage

Frt.	270# at .22	.59
Ctg.	at .0025 per ft.	2.00
	Total....	2.59

Labor and Board

Stringing Messenger	16.50
Dead ending	1.00
Splicing	1.00
Total....	18.50

Supervision	3.16
Total Local Dist.	24.25
Total Cost...	36.17

10,000# Messenger

Material

1000'	Messenger	20.88
10	Suspension Clamps	.57
10	Thru Bolts	.68
4	3 Bolt Clamps	.44
1	Thimble	.02
2	Strain Plates	.10
	Total....	22.69

Freight and Cartage

Frt.	340# at .22	.75
Ctg.	at .0025 per ft.	2.50
	Total....	3.25

Labor and Board

Stringing Messenger	17.50
Dead ending	1.25
Splicing	1.25
Total....	20.00

Supervision	3.49
Total Local Dist.	26.74
Total Cost...	49.43

16,000# Messenger

Material

1000'	Messenger	30.51
10	Suspension Clamps	.57
10	Thru Bolts	.68
5	- 3 Bolt Clamps	.55
1	Thimble	.02
2	Strain Bolts	.10
	Total....	32.43

Freight and Cartage

Frt.	470# at .22	1.03
Ctg.	at .0025 per ft.	3.00
	Total.....	4.03

Labor and Board

Stringing Messenger	18.25
Dead Ending	1.50
Splicing	1.50
Total....	21.25

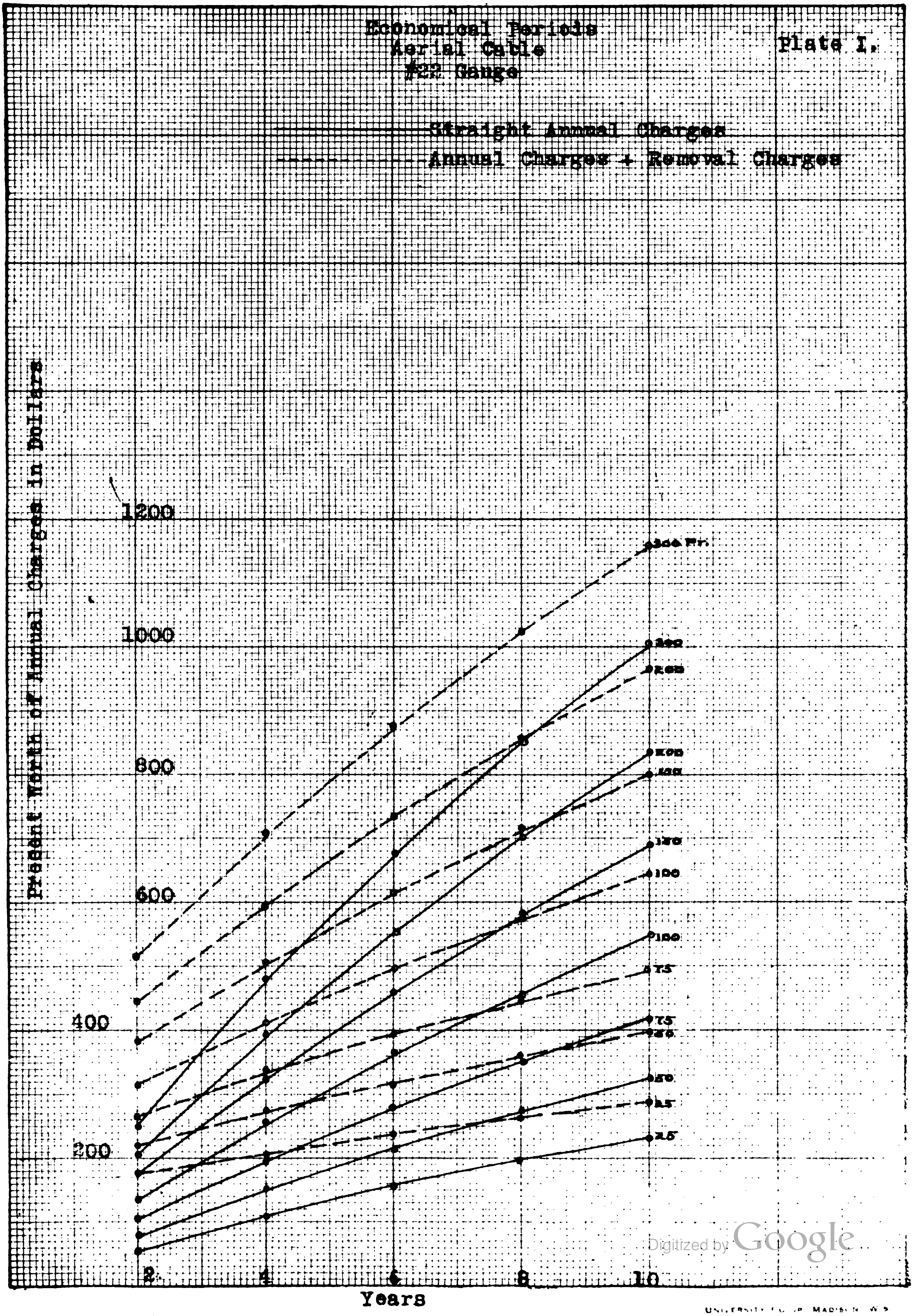
Supervision	3.79
Total Local Dist.	29.07
Total Cost...	61.50

TABLE V.

Cost of Dismantling Messenger Wire per 1000'.

Size of Messenger	Price of Messenger (new)	Price of Susp.Clmps. & Bolts (new)	Price of 3 blt.Clmps. thmbl.& St. Plates (new)	Ctg.	Labor & Board	Super-vision	Total Ctg., labor Board, Supv'n
6000#	9.70	1.25	.34	2.00	7.50	1.43	10.93
10000#	19.82	1.25	.56	2.50	10.00	1.88	14.38
16000	29.22	1.25	.67	3.00	12.50	2.33	17.83

The above prices are based on taking down messenger wire and suspension clamps, removing 3 bolt clamps from messenger and carting all material to store room. It is assumed that there will be for each 1000 ft. messenger and one dead ending around pole, and one-half of a splice to adjacent messenger.



Economical Periods
Aerial Cable
#22 Gauge

Plate I.

———— Straight Annual Charges
- - - - - - Annual Charges + Removal Charges

Plate II.

Economical Periods
Aerial Cable
#22 Gauge

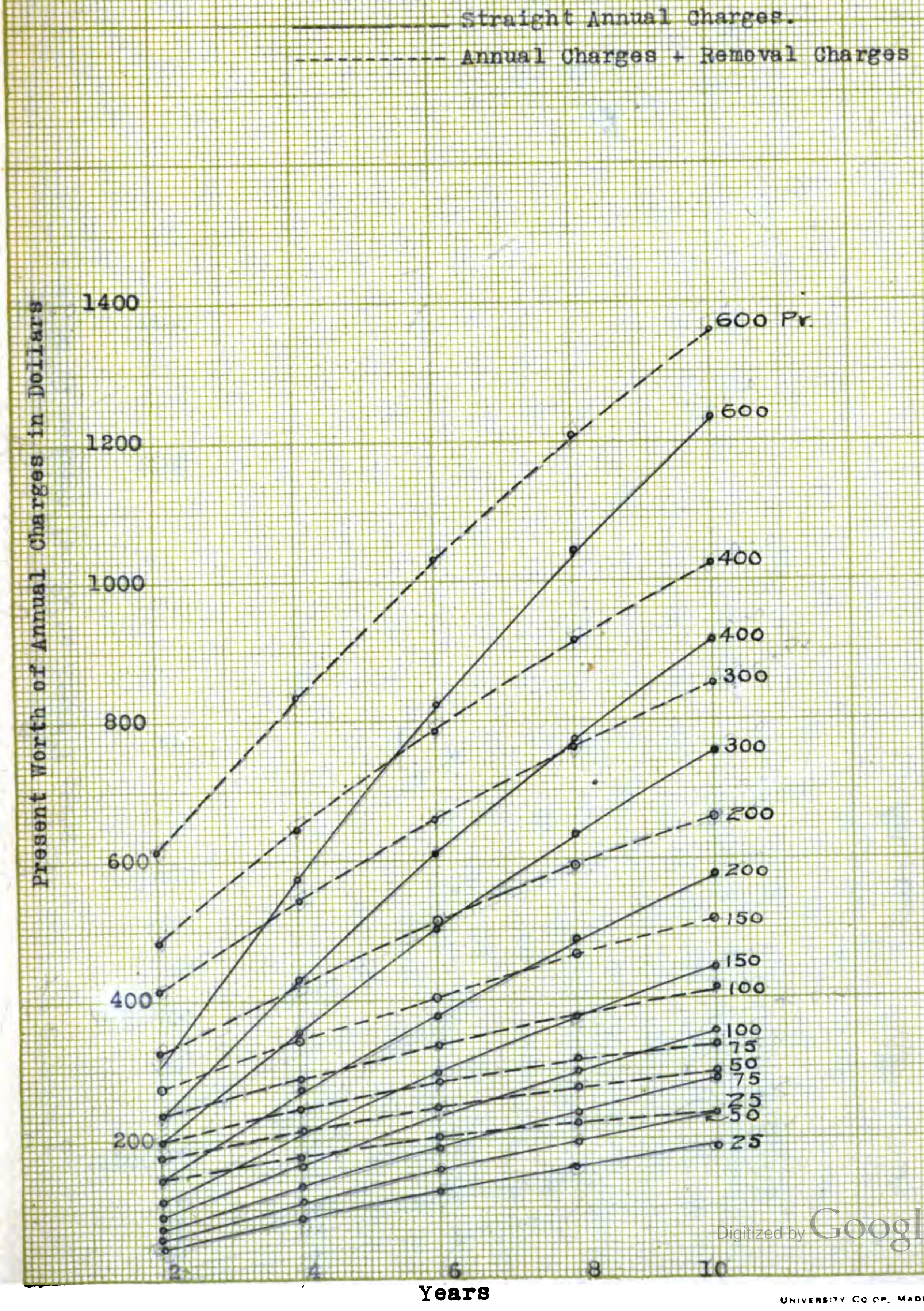
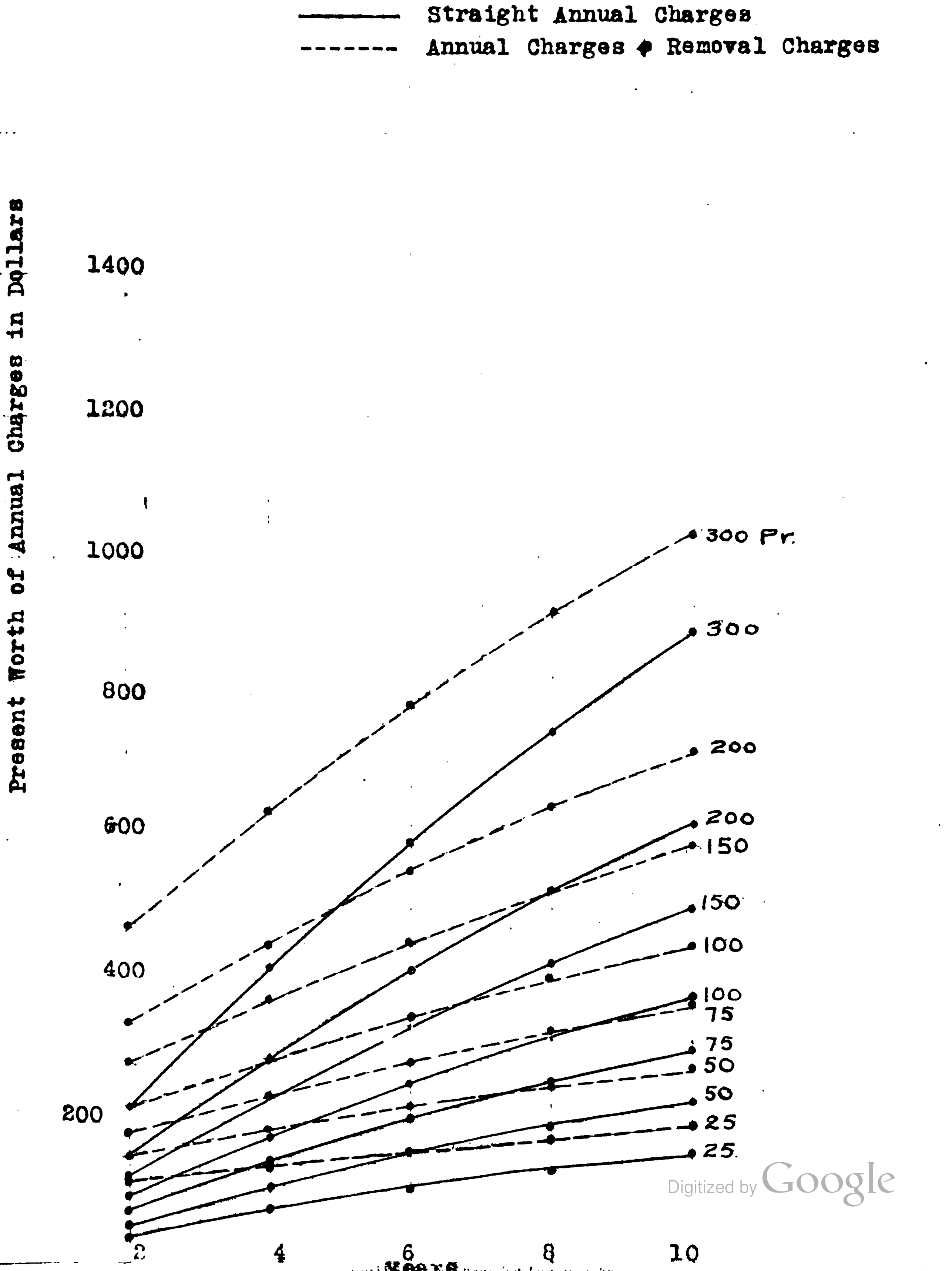


Plate III

Economical Periods
U. G. Cable
#19 Gauge



UNDERGROUND
#22 Gauge

Plate IV.

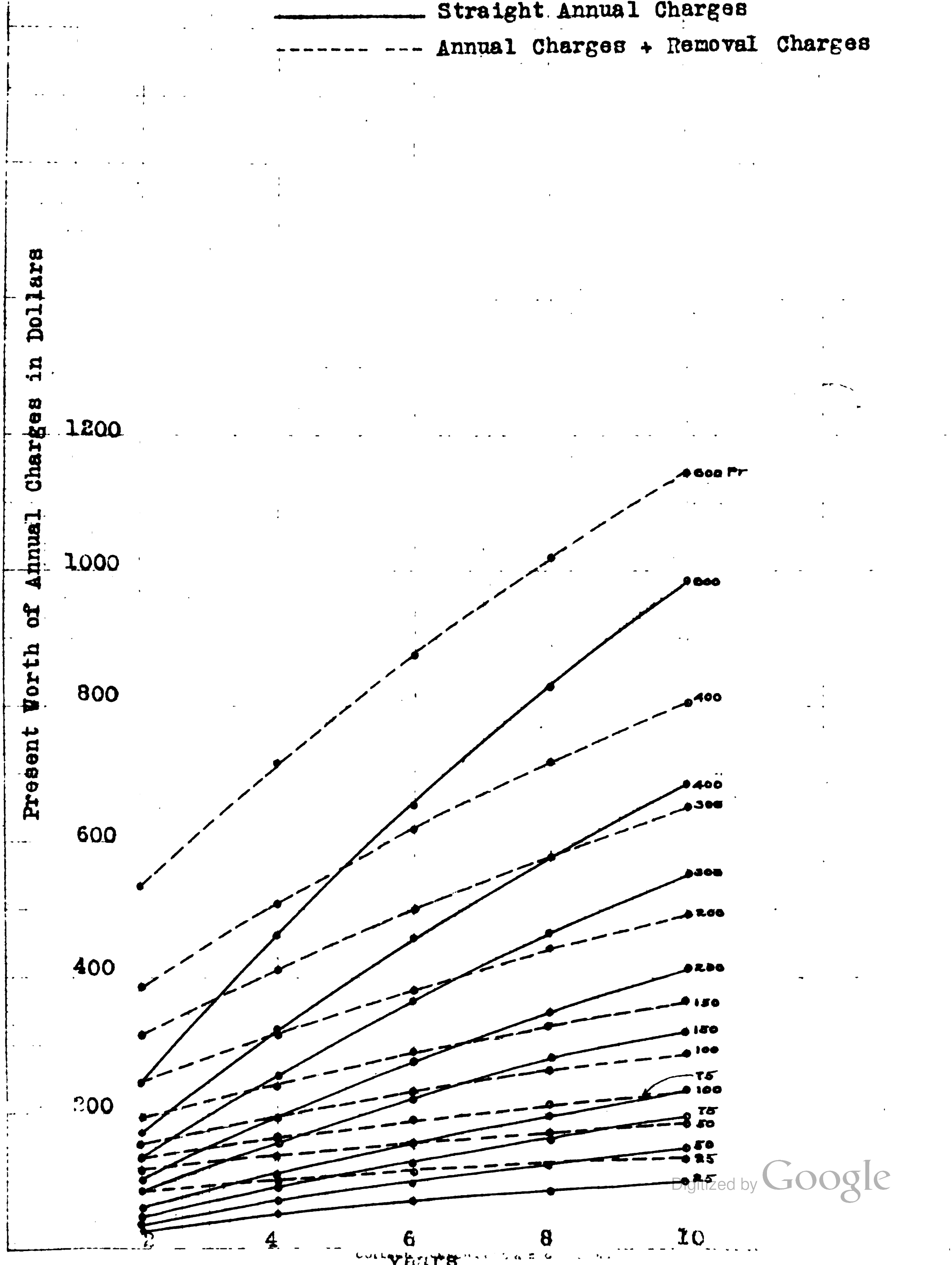


TABLE VI.

Cost of Straight and Multiple Splices
on Nos. 19 and 22 Gauge Paper Insulated Cable.

Splices In B.& S.	Size of Hood Sleeves	No. of Paper Slvs.	Wiping Solder #	Paraffin. #	Misc. Mat'l	Total Mat'l	Frt. & Stg.	Lab. & Brd.	Supervision	Total
Pr.										
10 St.	1x16	30	2	1-1/2	.08	.61	.03	1.30	.20	2.14
15 " "	1x16	40	2	1-1/2	.08	.62	.03	1.45	.22	2.32
25 " "	1-1/2x16	60	2-1/2	2	.08	.84	.04	1.75	.27	2.90
30 " "	1-1/2x16	70	2-1/2	2	.08	.84	.04	1.90	.29	3.07
50 " "	2x16	110	3	2	.11	.96	.05	2.50	.38	3.51
60 " "	2x16	135	3	2	.11	.97	.05	2.80	.43	4.25
75 " "	2-1/2x16	175	3	2-1/2	.11	1.20	.05	3.25	.50	5.00
100 " "	2-1/2x16	225	3	3	.11	1.22	.06	4.00	.61	5.89
120 " "	2-1/2x16	265	3	3	.11	1.22	.06	4.60	.70	6.58
150 " "	2-1/2x16	350	3	3-1/2	.14	1.29	.06	5.50	.83	7.68
200 " "	3x18	450	5	4	.14	1.70	.07	7.00	1.06	10.83
300 " "	3-1/2x18	700	6-1/2	5	.16	2.12	.08	10.00	1.51	13.71
400 " "	3-1/2x22	900	7	5	.16	2.35	.09	13.00	1.96	17.40
500 " "	4x24	1400	9	6	.21	3.10	.11	19.00	2.87	25.08
Pr										
10 Mlt.	1x16	30	2	1-1/2	.08	.61	.03	2.45	.39	3.48
15 " "	1-1/2x16	40	2	1-1/2	.08	.71	.03	2.68	.41	3.83
25 " "	1-1/2x16	60	2-1/2	2	.10	.86	.04	3.15	.48	4.51
30 " "	2x16	70	3	2	.10	.95	.05	3.35	.51	4.86
50 " "	2-1/2x16	110	3	2	.11	1.13	.05	4.25	.64	6.07
60 " "	2-1/2x16	135	3	2	.11	1.14	.05	4.70	.72	6.61
75 " "	3x16	175	5	2-1/2	.13	1.50	.06	5.38	.82	7.76
100 " "	3-1/2x16	225	6	2-1/2	.15	1.75	.07	6.50	1.00	9.32
120 " "	3-1/2x16	265	6	2-1/2	.15	1.75	.07	7.40	1.12	10.34
150 " "	4x18	350	8	3-1/2	.18	2.35	.09	9.50	1.44	13.38
200 " "	4x18	450	8	3-1/2	.18	2.35	.09	11.00	1.66	15.14
300 " "	4-1/2x22	700	9	4	.20	2.98	.10	15.50	2.34	20.92
400 " "	4-1/2x22	900	11	4-1/2	.22	3.30	.12	20.00	3.02	26.45
600 " "	5x24	1400	13	5	.25	4.10	.14	29.00	4.37	37.51

TABLE VII.

Cost of Paper Cable
Placed on Conduit ready for Splicing
Per 1000' Cable

Code & Size	Material	Freight & Cartage				Labor & Board				
	Price of Cable	Wgt. of Cable	Wgt. of Reels	Frt. on Cables and Reels	Hauling.	Rodding	Pulling	Supervision	Total Local Dist.	Total Cost
#22B&S		#	#							
A- 10	55.00	647	300	3.12	2.00	5.00	13.00	3.46	26.58	81.58
A- 15	69.00	758	300	3.40	2.00	5.00	13.00	3.51	26.91	95.91
A- 25	85.00	963	300	3.91	2.00	5.00	13.00	3.58	27.49	112.49
A- 50	130.00	1356	300	4.89	3.00	5.00	14.00	4.03	30.92	160.92
A- 75	175.00	1750	325	6.00	3.00	5.00	14.00	4.20	32.20	207.20
A-100	220.00	2252	350	7.38	3.00	5.00	16.00	4.70	36.08	256.08
A-150	290.00	2810	375	8.90	4.00	5.00	18.00	5.23	40.13	330.13
A-200	410.00	4108	400	12.27	4.00	5.00	18.00	5.89	45.16	455.16
A-300	550.00	5140	(2) 600	15.85	6.00	5.00	19.00	6.88	52.73	602.73
A-400	690.00	6328	(2) 700	19.32	6.00	5.00	20.00	7.55	57.87	747.87
A-600	1000.00	7982	(2) 800	23.96	7.00	5.00	28.00	9.59	73.55	1073.55
#19B&S										
C- 10	80.00	930	300	3.83	2.00	5.00	13.00	3.57	27.40	107.40
C- 15	100.00	1105	300	4.26	2.00	5.00	13.00	3.64	27.90	127.90
C- 25	140.00	1352	300	4.88	3.00	5.00	14.00	4.03	30.91	170.91
C- 50	220.00	2037	350	6.84	3.00	5.00	16.00	4.62	35.45	255.46
C- 75	300.00	2687	400	8.72	4.00	5.00	17.00	5.21	39.93	339.93
C-100	380.00	3918	400	11.80	4.00	5.00	18.00	5.82	44.52	424.62
C-150	510.00	4810	(2) 600	15.03	6.00	5.00	19.00	6.75	51.78	561.78
C-200	640.00	5880	(2) 700	18.20	6.00	5.00	20.00	7.38	56.58	696.58
C-300	930.00	7800	(2) 800	23.50	7.00	5.00	28.00	9.52	73.02	1003.02

Splicing costs are added to the total cost in order to get net cost.

TABLE VIII.

Cost of Dismantling Serviceable U. G. Cable per 1000' of Cable.

Including cost of pulling out cable, testing, placing on reels for future use and hauling to store room.

		Labor & Board				
Size and Gauge	Cartage to Store Rm.	Reeling up	Testing	Total Labor and Board	Super-vision	Total cost
#22						
A- 10	2.00	11.75	2.75	14.50	2.47	18.97
A-15	2.00	11.75	2.75	14.50	2.47	18.97
A- 25	2.00	11.75	2.75	14.50	2.47	18.97
A- 30	2.00	11.75	2.75	14.50	2.47	18.97
A- 50	3.00	15.70	3.70	19.40	3.36	25.76
A- 60	3.00	15.70	3.70	19.40	3.36	25.76
A- 75	3.00	15.70	3.70	19.40	3.36	25.76
A-100	3.00	15.70	3.70	19.40	3.36	25.76
A-120	4.00	23.50	5.50	29.00	4.95	37.95
A-150	4.00	23.50	5.50	29.00	4.95	37.95
A-200	4.00	23.50	5.50	29.00	4.95	37.95
A-300	6.00	29.40	6.90	36.30	6.34	48.64
A-400	6.00	29.40	6.90	36.70	6.34	48.64
A-600	7.00	29.40	6.90	36.30	6.34	49.79
#19						
C- 10	2.00	11.75	2.75	14.50	2.47	18.97
C- 15	2.00	11.75	2.75	14.50	2.47	18.97
C- 25	3.00	15.70	3.70	19.40	3.36	25.76
C- 30	3.00	15.70	3.70	19.40	3.36	25.76
C- 50	3.00	15.70	3.70	19.40	3.36	25.76
C- 60	3.00	15.70	3.70	19.40	3.36	25.76
C- 75	4.00	23.50	3.50	29.00	4.95	37.95
C-100	4.00	23.50	3.50	29.00	4.95	37.95
C-120	6.00	23.50	3.50	29.00	4.95	37.95
C-150	6.00	29.40	6.9	36.30	6.34	48.64
C-300	7.00	29.40	6.9	36.30	6.49	49.79

Testing consists in testing for defective conductors only and working out conductors on the reel.

TABLE IX.

Cost of Dismantling Serviceable U. G. Cable per 1000' of Cable.

Including cost of pulling out cable, cutting into pieces for shipping, boxing and carting to store room, together with salvage value as junk.

		(A)	Cost of dismantling & Junking. (B)					
Code & Size	Wt. per 1000'	Value as Junk at 5c pr.lb.	Pulling out	Cutting up and Boxing	Cart-age	Super-vision 15% L.D.	Total	Net Sal-vage
#22 B&S Pr.								(A-B)
A- 10 pr.	647	32.50	11.75	2.75	2.00	2.47	18.97	13.53
A- 15 "	758	37.90	11.75	2.75	2.00	2.47	18.97	18.93
A- 25 "	963	48.15	11.75	2.75	2.00	2.47	18.97	29.18
A- 30 "	1059	52.95	11.75	2.75	2.00	2.47	18.97	33.98
A- 50 "	1356	67.80	15.70	3.70	3.00	3.36	25.76	42.04
A- 60 "	1490	74.50	15.70	3.70	3.00	3.36	25.76	48.74
A- 75 "	1750	87.50	15.70	3.70	3.00	3.36	25.76	61.74
A-100 "	2252	112.60	15.70	3.70	3.00	3.36	25.76	86.84
A-120 "	2480	124.00	23.50	5.50	4.00	4.95	37.95	86.05
A-150 "	2810	140.50	23.50	5.50	4.00	4.95	37.95	102.55
A-200 "	4108	205.40	23.50	5.50	4.00	4.95	37.95	167.45
A-300 "	5140	257.00	29.40	6.90	6.00	6.34	48.64	208.36
A-400 "	6328	316.40	29.40	6.90	6.00	6.34	48.64	267.76
A-600 "	7982	399.10	29.40	6.90	7.00	6.49	49.79	349.31
#19 B&S Pr.								
C- 10 "	930	48.50	11.75	2.75	2.00	2.47	18.97	27.53
C- 15 "	1105	55.25	11.75	2.75	2.00	2.47	18.97	36.28
C- 25 "	1352	67.60	15.70	3.70	3.00	3.36	25.76	41.84
C- 30 "	1520	76.00	15.70	3.70	3.00	3.36	25.76	50.24
C- 50 "	2037	101.65	15.70	3.70	3.00	3.36	25.76	75.89
C- 60 "	2295	114.75	15.70	3.70	3.00	3.36	25.76	88.99
C- 75 "	2687	134.65	23.56	5.50	4.00	4.95	37.95	96.70
C-100 "	3918	195.90	23.56	5.50	4.00	4.95	37.95	157.95
C-120 "	4520	226.00	23.50	5.50	4.00	4.95	37.95	188.05
C-150 "	4810	240.50	29.40	6.90	6.00	6.34	48.64	191.86
C-200 "	5880	294.00	29.40	6.90	6.00	6.34	48.64	245.36
C-300 "	7800	390.00	29.40	6.90	7.00	6.49	49.79	340.21

TABLE X.

The Cost of Bonding U. G. Cables in Man Holes.

	Material			Labor & Board			
Bond Connecting	Copper Strip	Solder	Total	Frt. & ctg.	Placing Strip & Wiping Paint	Supervision	Total
2 Cables	1-1/2'-.03	2#-..31	.44	.01	.60	.09	.70
3 "	3'-.07	3 - .46	.53	.02	.80	.12	.94
4 "	4-1/2'-.10	4 - .62	.72	.02	1.00	.16	1.17
5 "	6'-.13	5 - .77	.90	.03	1.20	.18	1.41
6 "	7-1/2'-.16	6 - .92	1.08	.03	1.40	.21	1.64
7 "	9'-.20	7 -1.08	1.28	.04	1.60	.25	1.89
8 "	10-1/2'-.23	8 -1.23	1.43	.04	1.80	.28	2.12
9 "	12'-.26	9 -1.39	1.65	.05	2.00	.31	2.36
10 "	13-1/2'-.29	10-1.54	1.83	.05	2.20	.34	2.59
11 ""	15'-.33	11-1.70	2.03	.06	2.40	.37	2.83
12 "	16-1/2'-.36	12-1.85	2.21	.06	2.00	.40	3.06
13 "	18'-.39	13-2.01	2.40	.07	2.80	.43	3.30
14 "	19-1/2'-.42	14-2.16	2.56	.07	3.00	.46	3.53
15 "	21'-.45	15-2.32	2.77	.08	3.20	.49	3.77
16 "	22-1/2'-.48	16-2.47	2.95	.08	3.40	.52	4.00
17 "	24'-.52	17-2.63	3.15	.09	3.60	.55	4.24
18 "	25-1/2'-.55	18-2.78	3.33	.09	3.80	.58	4.47
19 "	27'-.58	19-2.93	3.51	.10	4.00	.62	4.72
20 "	28-1/2'-.61	20-3.08	3.69	.10	4.20	.65	4.85

The above prices for banding cables are based on connecting the cables together with a copper strip and joining this strip to each cable by a wiped point.

The prices are for cable band and with the number of cables to be connected together in any one man hole. Banding three new cables, or banding two new cables to two old cables (the latter having been previously banded together) is listed as "Band connecting 3 cables", etc.

TABLE XI.

22 Gauge Aerial Cable					19 Gauge Aerial Cable			
Material	Labor to Erect	Total	Labor to Remove	Size	Material	Labor to Erect	Total	Labor to Remove
113.92	60.40	174.32	26.80	25	154.27	60.52	214.79	31.34
156.33	63.54	219.87	31.41	50	231.70	70.04	301.74	36.23
195.24	66.76	262.00	34.27	75	313.84	75.26	389.10	38.89
252.60	76.19	328.79	36.23	100	430.39	78.98	509.37	41.69
334.31	78.80	413.11	38.89	150	554.93	87.21	642.14	47.15
453.47	83.05	536.52	41.69	200	684.12	91.24	775.36	52.61
604.46	99.52	703.98	47.14	300	843.08	99.79	942.87	59.90
744.34	108.67	853.01	52.61	400				
1020.73	128.06	1148.79	58.11	600				

22 Gauge U.G.					19 Gauge U.G.			
Material	Labor to Erect	Total	Labor to Remove	Size	Material	Labor to Erect	Total	Labor to Remove
93.97	29.23	122.80	26.80	25	150.54	30.68	181.22	31.34
141.09	33.68	174.77	31.41	50	233.04	36.27	269.31	36.23
188.06	36.90	224.96	34.27	75	316.78	40.91	357.69	38.89
234.76	42.42	277.18	36.23	100	400.18	45.54	445.72	41.69
308.04	50.83	358.87	38.89	150	536.17	54.35	590.52	47.15
432.25	57.67	489.92	41.69	200	670.18	61.08	731.26	52.61
579.33	71.74	651.07	47.15	300	967.98	83.38	1051.36	67.31
724.62	85.49	810.11	52.61	900				
1041.62	119.70	1161.32	61.31	600				

TABLE XII.

#19 Gauge Aerial - 25 Pr.

Yrs.	Dep. on Mat'ls	Labor to Erect	Removal Charges	I.T.M.	I.T.M.D.	Present worth of $1.	Present worth of annuity of $1.	Present worth of I.T.M.D.	Present worth of I.T.M. & Removal Chgs.
2	6.32	60.50	71.01	22.80	31.40	.89	1.83	57.50	170.40
4	6.32	60.50	71.01	22.80	31.40	.79	3.47	109.00	205.10
6	6.32	60.50	71.01	22.80	31.40	.71	4.92	154.20	236.40
8	6.32	60.50	71.01	22.80	31.40	.63	6.22	195.00	264.70
10	6.32	60.50	71.01	22.80	31.40	.56	7.36	231.00	287.75
				#19 Gauge Aerial - 50 Pr.					
2	9.50	70.04	91.88	31.65	44.00	.89	1.83	80.50	219.30
4	9.50	70.04	91.88	31.65	44.00	.79	3.47	152.50	270.60
6	9.50	70.04	91.88	31.65	44.00	.71	4.92	216.00	316.20
8	9.50	70.04	91.88	31.65	44.00	.63	6.22	274.00	357.90
10	9.50	70.04	91.88	31.65	44.00	.56	7.36	324.00	393.40
				#19 Guage Aerial - 75 Pr.					
2	12.85	75.26	110.29	40.08	56.80	.89	1.83	104.00	262.80
4	12.85	75.26	110.29	40.08	56.80	.79	3.47	197.00	330.70
6	12.85	75.26	110.29	40.08	56.80	.71	4.92	279.00	391.75
8	12.85	75.26	110.29	40.08	56.80	.63	6.22	354.00	446.50
10	12.85	75.26	110.29	40.08	56.80	.56	7.36	418.00	493.75
				#19 Gauge Aerial - 100 Pr.					
2	17.65	78.98	130.69	53.50	74.50	.89	1.83	136.50	316.80
4	17.65	78.98	130.69	53.50	74.50	.79	3.47	258.50	413.20
6	17.65	78.98	130.69	53.50	74.50	.71	4.92	366.00	497.80
8	17.65	78.98	130.69	53.50	74.50	.63	6.22	464.00	574.25
10	17.65	78.98	130.69	53.50	74.50	.56	7.36	549.00	640.20
				#19 Gauge Aerial - 150 Pr.					
2	22.75	87.21	158.20	67.40	93.70	.89	1.83	171.50	384.00
4	22.75	87.21	158.20	67.40	93.70	.79	3.47	325.00	507.00
6	22.75	87.21	158.20	67.40	93.70	.71	4.92	460.00	617.30
8	22.75	87.21	158.20	67.40	93.70	.63	6.22	582.00	714.80
10	22.75	87.21	158.20	67.40	93.70	.56	7.36	690.00	801.70

TABLE XII-a

Yrs.	Dep. on Mat'ls	Labor to Erect	Removal Charges	I.T.M.	I.T.M.D.	Present Worth of $1.	Present worth of Annuity of $1.	Present worth of I.T.M.D.	Present Worth of I.T.M. & Removal Chgs.
				#19 Gauge Aerial - 200 Pr.					
2	28.20	91.24	183.26	81.50	113.20	.89	1.83	207.00	445.10
4	28.20	91.24	183.26	81.50	113.20	.79	3.47	393.00	597.80
6	28.20	91.24	183.26	81.50	113.20	.71	4.92	556.00	733.20
8	28.20	91.24	183.26	81.50	113.20	.63	6.22	704.00	855.50
10	28.20	91.24	183.26	81.50	113.20	.56	7.00	834.00	960.80
				#19 Gauge Aerial - 300 Pr.					
2	34.60	99.79	210.80	99.00	137.80	.89	1.83	252.00	519.60
4	34.60	99.79	210.80	99.00	137.80	.79	3.47	478.00	709.53
6	34.60	99.79	210.80	99.00	137.80	.71	4.92	676.00	877.80
8	34.60	99.79	210.80	99.00	137.80	.63	6.22	857.00	1026.00
10	34.60	99.79	210.80	99.00	137.80	.56	7.36	1015.00	1157.28
				#22 Gauge Aerial - 25 Pr.					
					A		B	A B	
2	4.67	60.40	64.85	18.32	25.45	.89	1.83	46.60	148.70
4	4.67	60.40	64.85	18.32	25.45	.79	3.47	88.30	179.00
6	4.67	60.40	64.85	18.32	25.45	.71	4.92	125.20	201.80
8	4.67	60.40	64.85	18.32	25.45	.63	6.22	158.20	221.80
10	4.67	60.40	64.85	18.32	25.45	.56	7.36	187.50	239.30
				#22 Gauge Aerial - 50 Pr.					
2	6.42	63.54	75.81	23.05	32.10	.89	1.83	58.80	178.00
4	6.42	63.54	75.81	23.05	32.10	.79	3.47	111.50	212.50
6	6.42	63.54	75.81	23.05	32.10	.71	4.92	157.20	243.80
8	6.42	63.54	75.81	23.05	32.10	.63	6.22	199.50	271.30
10	6.42	63.54	75.81	23.05	32.10	.56	7.36	236.00	295.00
				#22 Gauge Aerial - 75 Pr.					
2	8.02	66.76	84.85	27.50	38.15	.89	1.83	70.00	199.70
4	8.02	66.76	84.85	27.50	38.15	.79	3.47	136.50	242.50
6	8.02	66.76	84.85	27.50	38.15	.71	4.92	188.00	280.20
8	8.02	66.76	84.85	27.50	38.15	.63	6.22	238.00	316.30
10	8.02	66.76	84.85	27.50	38.15	.56	7.36	282.00	336.80

TABLE XII-b

#22 Gauge Aerial Cable - 100 Pr.

Yrs.	Dep. on Mat'ls	Labor to Erect	Removal Charges	I.T.M.	I.T.M.D.	Present worth of $1.	Present worth of Annuity of $1.	Present worth of I.T.M.D.	Present Worth of I.T.M. & Removal Chgs.
2	10.35	76.19	95.13	33.20	48.00	.89	1.83	87.90	232.10
4	10.35	76.19	95.13	33.20	48.00	.79	3.47	166.50	286.70
6	10.35	76.19	95.13	33.20	48.00	.71	4.92	236.00	335.60
8	10.35	76.19	95.13	33.20	48.00	.63	6.22	298.40	379.00
10	10.35	76.19	95.13	33.20	48.00	.56	7.36	353.20	416.30
#22 Gauge Aerial Cable - 150 Pr.									
2	13.70	78.80	113.49	41.60	60.30	.89	1.83	110.20	271.30
4	13.70	78.80	113.49	41.60	60.30	.79	3.57	215.00	345.00
6	13.70	78.80	113.49	41.60	60.30	.71	4.92	296.00	403.00
8	13.70	78.80	113.49	41.60	60.30	.63	6.22	375.00	463.50
10	13.70	78.80	113.49	41.60	60.30	.56	7.36	444.00	515.50
#22 Gauge Aerial Cable - 200 Pr.									
2	18.56	83.05	134.19	54.10	78.40	.89	1.83	143.40	326.50
4	18.56	83.05	134.19	54.10	78.40	.79	3.47	272.00	424.20
6	18.56	83.05	134.19	54.10	78.40	.71	4.93	376.00	511.30
8	18.56	83.05	134.19	54.10	78.40	.63	6.22	488.00	589.50
10	18.56	83.05	134.19	54.10	78.40	.56	7.36	578.00	657.20
#22 Gauge Aerial Cable - 300 Pr.									
2	24.78	99.52	165.59	71.10	102.50	.89	1.83	187.20	411.30
4	24.78	99.52	165.59	71.10	102.50	.79	3.47	365.00	543.00
6	24.78	99.52	165.59	71.10	102.50	.71	4.92	504.00	659.50
8	24.78	99.52	165.59	71.10	102.50	.63	6.22	637.00	762.20
10	24.78	99.52	165.59	71.10	102.50	.56	7.36	753.00	854.70
#22 Gauge Aerial Cable - 400 Pr.									
2	30.50	108.67	192.46	86.25	124.40	.89	1.83	226.80	481.20
4	30.50	108.67	192.46	86.25	124.40	.79	3.47	430.00	644.00
6	30.50	108.67	192.46	86.25	124.40	.71	4.92	610.00	786.70
8	30.50	108.67	192.46	86.25	124.40	.63	6.22	772.00	915.20
10	30.50	108.67	192.46	86.25	124.40	.56	7.36	913.00	1028.00

TABLE XII-c

#22 Gauge Aerial Cable-600 Pr.

Yrs.	Dep. on Mat'ls	Labor to Erect	Removal Charges	I.T.M.	I.T.M.D.	Present Worth of $1.	Present Worth of Annuity of $1.	Present Worth of I.T.M.D.	Present Worth of I.T.M. & Removal Chgs.
2	40.80	128.06	238.96	116.00	167.80	.89	1.83	307.00	615.00
4	40.80	128.06	238.96	116.00	167.80	.79	3.47	582.00	835.00
6	40.80	128.06	238.96	116.00	167.80	.71	4.92	825.00	1031.50
8	40.80	128.06	238.96	116.00	167.80	.63	6.22	1044.00	1205.50
10	40.80	128.06	238.96	116.00	167.80	.56	7.36	1235.00	1359.00
				#22 Gauge U. G. Cable - 25 Pr.					
2	2.82	29.23	40.84	10.40	14.10	.89	1.83	25.80	86.60
4	2.82	29.23	40.84	10.40	14.10	.79	3.47	49.00	101.50
6	2.82	29.23	40.84	10.40	14.10	.71	4.92	69.50	114.70
8	2.82	29.23	40.84	10.40	14.10	.63	6.22	87.70	126.25
10	2.82	29.23	40.84	10.40	14.10	.56	7.36	103.90	136.40
				#22 Gauge U. G. Cable - 50 Pr.					
2	4.23	33.68	52.57	14.80	20.50	.89	1.83	36.80	111.70
4	4.23	33.68	52.57	14.80	20.50	.79	3.47	69.80	134.60
6	4.23	33.68	52.57	14.80	20.50	.71	4.92	98.80	154.90
8	4.23	33.68	52.57	14.80	20.50	.63	6.22	125.00	173.00
10	4.23	33.68	52.57	14.80	20.50	.56	7.36	148.00	188.50
				#22 Gauge U. G. Cable - 75 Pr.					
2	5.65	36.90	62.48	19.10	25.90	.89	1.83	47.40	133.80
4	5.65	36.90	62.48	19.10	25.90	.79	3.47	90.00	164.40
6	5.65	36.90	62.48	19.10	25.90	.71	4.92	127.50	192.20
8	5.65	36.90	62.48	19.10	25.90	.63	6.22	161.00	216.60
10	5.65	36.90	62.48	19.10	25.90	.56	7.36	190.50	236.50
				#22 Gauge U. G. Cable - 100 Pr.					
2	7.05	42.42	71.44	23.60	21.90	.89	1.83	58.40	157.50
4	7.05	42.42	71.44	23.60	21.90	.79	3.47	110.80	196.50
6	7.05	42.42	71.44	23.60	21.90	.71	4.92	157.00	231.80
8	7.05	42.42	71.44	23.60	21.90	.63	6.22	198.50	262.70
10	7.05	42.42	71.44	23.60	21.90	.56	7.36	235.00	289.60

TABLE XII-3

#22 Gauge U. G. Cable - 150 Pr.

Yrs.	Dep on Mat'ls	Labor to Erect	Removal Charges	I.T.M.	I.T.M.D.	Present Worth of $1.	Present Worthof Annuity of $1.	Present Worth of I.T.M.D.	Present Worth of I.T.M. & Removal Chgs.
2	9.24	50.83	85.09	30.50	44.80	.89	1.83	82.00	193.80
4	9.24	50.83	85.09	30.50	44.80	.79	3.47	155.50	245.90
6	9.24	50.83	85.09	30.50	44.80	.71	4.92	220.00	292.50
8	9.24	50.83	85.09	30.50	44.80	.63	6.22	279.00	332.70
10	9.24	50.83	85.09	30.50	44.80	.56	7.36	320.26	368.70
				#22 Gauge U. G. Cable - 200 Pr.					
2	12.97	57.67	106.59	41.60	56.30	.89	1.83	103.00	246.30
4	12.97	57.67	106.59	41.60	56.30	.79	3.47	195.20	319.30
6	12.97	57.67	106.59	41.60	56.30	.71	4.92	276.00	384.80
8	12.97	57.67	106.59	41.60	56.30	.63	6.22	350.00	443.25
10	12.97	57.67	106.59	41.60	56.30	.56	7.36	414.00	492.75
				#22 Gauge U. G. Cable - 300 Pr.					
2	17.38	71.74	135.05	55.40	74.90	.89	1.83	137.30	316.50
4	17.38	71.74	135.05	55.40	74.90	.79	3.47	260.00	415.00
6	17.38	71.74	135.05	55.40	74.90	.71	4.92	368.00	503.40
8	17.38	71.74	135.05	55.40	74.90	.63	6.22	466.00	582.10
10	17.38	71.74	135.05	55.40	74.90	.56	7.36	552.00	651.75
				#22 Gauge U. G. Cable - 400 Pr.					
2	21.74	85.49	161.11	68.80	93.10	.89	1.83	170.50	385.30
4	21.74	85.49	161.11	68.80	93.10	.79	3.47	323.00	509.20
6	21.74	85.49	161.11	68.80	93.10	.71	4.92	458.00	620.30
8	21.74	85.49	161.11	68.80	93.10	.63	6.22	578.00	718.50
10	21.74	85.49	161.11	68.80	93.10	.56	7.36	685.00	804.20
				#22 Gauge U. G. Cable - 600 Pr.					
2	31.25	119.70	217.31	98.70	133.50	.89	1.83	244.50	535.50
4	31.25	119.70	217.31	98.70	133.50	.79	3.47	464.00	718.75
6	31.25	119.70	217.31	98.70	133.50	.71	4.92	658.00	878.30
8	31.25	119.70	217.31	98.70	133.50	.63	6.22	830.00	1021.00
10	31.25	119.70	217.31	98.70	133.50	.56	7.36	984.00	1146.80

TABLE XII-e

Yrs.	Dep. on Mat'ls	Labor to Erect	Removal Charges	I.T.M.	I.T.M.D.	Present Worth of $1.	Present Worth of Annuity of $1.	Present Worth of I.T.M.D.	Present Worth of I.T.M. & Removal Chgs.
				#19 Gauge U. G. Cable - 25 Pr.					
2	4.52	30.68	53.94	15.38	20.85	.89	1.83	38.20	111.70
4	4.92	30.68	53.94	15.38	20.85	.79	3.47	72.50	136.20
6	4.92	30.68	53.94	15.38	20.85	.71	4.92	102.50	157.70
8	4.92	30.68	53.94	15.38	20.85	.63	6.22	130.00	177.00
10	4.92	30.68	53.94	15.38	20.85	.56	7.36	153.50	194.20
				#19 Gauge U. G. Cable - 50 Pr.					
2	7.00	36.27	71.23	22.90	30.95	.89	1.83	56.70	150.40
4	7.00	36.27	71.23	22.90	30.95	.79	3.47	107.50	188.75
6	7.00	36.27	71.23	22.90	30.95	.71	4.92	152.00	223.40
8	7.00	36.27	71.23	22.90	30.95	.63	6.22	192.50	253.30
10	7.00	32.27	71.23	22.90	30.95	.56	7.36	228.00	274.49
				#19 Gauge U. G. Cable - 75 Pr.					
2	9.53	40.91	86.39	30.40	41.20	.89	1.83	75.40	186.30
4	9.53	40.91	86.39	30.40	41.20	.79	3.47	143.00	239.20
6	9.53	40.91	86.39	30.40	41.20	.71	4.92	202.50	286.90
8	9.53	40.91	86.39	30.40	41.20	.63	6.22	256.00	328.40
10	9.53	40.91	86.39	30.40	41.20	.56	7.36	303.00	365.40
				#19 Gauge U. G. Cable - 100 Pr.					
2	12.00	45.54	101.69	37.90	51.30	.89	1.83	94.00	221.50
4	12.00	45.54	101.69	37.90	51.30	.79	3.47	178.00	289.90
6	12.00	45.54	101.69	37.90	51.30	.71	4.92	252.50	349.70
8	12.00	45.54	101.69	37.90	51.30	.63	6.22	319.00	463.00
10	12.00	45.54	101.69	37.90	51.30	.56	7.36	378.00	449.95

TABLE XII-f

#19 Gauge U. G. Cable - 150 Pr.

Yrs.	Dep. on Mat'ls	Labor to Erect	Removal Charges	I.T.M.	I.T.M.D.	Present Worth of $1.	Present Worth of Annuity of $1.	Present Worth of I.T.M.D.	Present Worth of I.T.M. & Removal Chgs.
2	16.05	54.35	127.65	50.25	68.00	.89	1.83	124.50	283.00
4	16.05	54.35	127.65	50.25	68.00	.79	3.47	236.00	373.80
6	16.05	54.35	127.65	50.25	68.00	.71	4.92	335.00	454.70
8	16.05	54.35	127.65	50.25	68.00	.63	6.22	423.00	527.50
10	16.05	54.35	127.65	50.25	68.00	.56	7.36	501.00	589.60

#19 Gauge U. G. Cable - 200 Pr.

Yrs.	Dep. on Mat'ls	Labor to Erect	Removal Charges	I.T.M.	I.T.M.D.	Present Worth of $1.	Present Worth of Annuity of $1.	Present Worth of I.T.M.D.	Present Worth of I.T.M. & Removal Chgs.
2	20.10	61.08	153.11	62.20	84.10	.89	1.83	154.00	341.20
4	20.10	61.08	153.11	62.20	84.10	.79	3.47	292.00	455.00
6	20.10	61.08	153.11	62.20	84.10	.71	4.92	414.00	556.80
8	20.10	61.08	153.11	62.20	84.10	.63	6.22	523.50	646.50
10	20.10	61.08	153.11	62.20	84.10	.56	7.36	620.00	725.80

#19 Gauge U. G. Cable - 300 Pr.

Yrs.	Dep. on Mat'ls	Labor to Erect	Removal Charges	I.T.M.	I.T.M.D.	Present Worth of $1.	Present Worth of Annuity of $1.	Present Worth of I.T.M.D.	Present Worth of I.T.M. & Removal Chgs.
2	29.00	83.38	206.31	89.50	121.00	.89	1.83	221.00	474.50
4	29.00	83.38	206.31	89.50	121.00	.79	3.47	420.00	640.50
6	29.00	83.38	206.31	89.50	121.00	.71	4.92	595.00	789.00
8	29.00	83.38	206.31	89.50	121.00	.63	6.22	752.00	920.00
10	29.00	83.38	206.31	89.50	121.00	.56	7.36	892.00	1033.50

APPROVED BY M C Beebe, Prof Elec Eng

W. G. Schneider

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